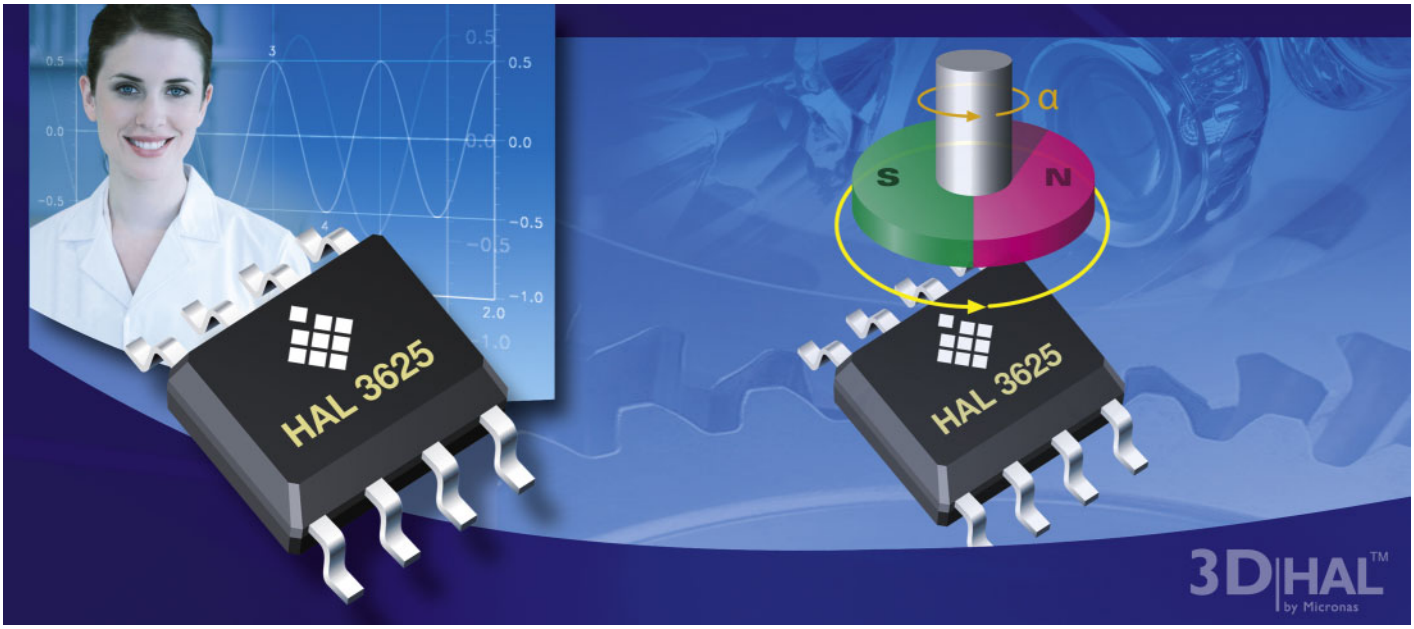
HAL 3625

Sept/2009



HAL® 3625
Programmable Direct Angle Sensor

The HAL 36xy family is a new generation of Hall-effect sensors. Due to its advanced vertical Hall-plate technology it enables the possibility to measure magnetic fields in the chip plane. With this technology it is possible to directly measure rotation angles in a range of 0° to 360° with simple magnetic arrangements. The first member of this family is the HAL 3625.

Two on-chip vertical Hall plates measure both magnetic field components BX and BY. The direct angle information is internally calculated by the sensor using the inverse tangent function and converted into an analog output voltage. Due to the measurement method, the sensor provides an excellent drift performance over temperature and therefore a new class of accuracy.

The sensor provides a linear, ratiometric analog output signal with implemented wire-break detection working with a pull-up or pull-down resistor.

Major characteristics like gain and offset of X- and Y-channel, zero-angle position, phase shift between X- and Y-channel, output slope and offset and clamping levels can be adjusted to the magnetic circuit by programming the non-volatile memory.

The HAL 3625 is available in the very small SOIC8 SMD package.

Main Features

- Angular accuracy of ±1.0° for 360° angle range
- Angle measurement is extremely is robust against temperature and stress influence
- Ratiometric linear analog output is proportional to the measured angle
- Integral non-linearity error of output signal ±0.1% of V_{DD}
- Ratiometric error of output signal ±0.2%
- Output response time 1 ms (slow mode)
- Low output noise of 0.2° rms
- Wire-break detection with pull-up or pull-down resistor
- Over- and undervoltage detection
- Programmable characteristics in a non-volatile memory with redundancy and lock function
- Programming of the sensor via its output with TTL level
- Programmable output slope and offset
- X- and Y-channel gain and offset of signal path programmable
- Phase shift between X- and Y-channel programmable
- Programmable output clamping voltages for error band definition
- Programmable magnet lost detection
- 32 bit identification number for customer
- Operates from –40 °C up to 170 °C junction temperature
- Operates from 4.5 V up to 5.5 V supply voltage
- Short-circuit protected push-pull output
- Over- and reverse-voltage protection at V_{DD} pin
- On-board diagnostic functions

Applications

- Due to the sensor's versatile programming characteristics and its high accuracy, the HAL 3625 is the optimal system solution for applications such as:
  - Contactless potentiometers
  - Rotary position measurement

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Development Tools

- For engineering and production purposes, Micronas offers an easy-to-use application kit:
  - Micronas programmer board (HAL-APB V 1.3)
  - LabVIEW™ programming software for Windows® 9x/2000/XP/Vista
  - LabVIEW VIs

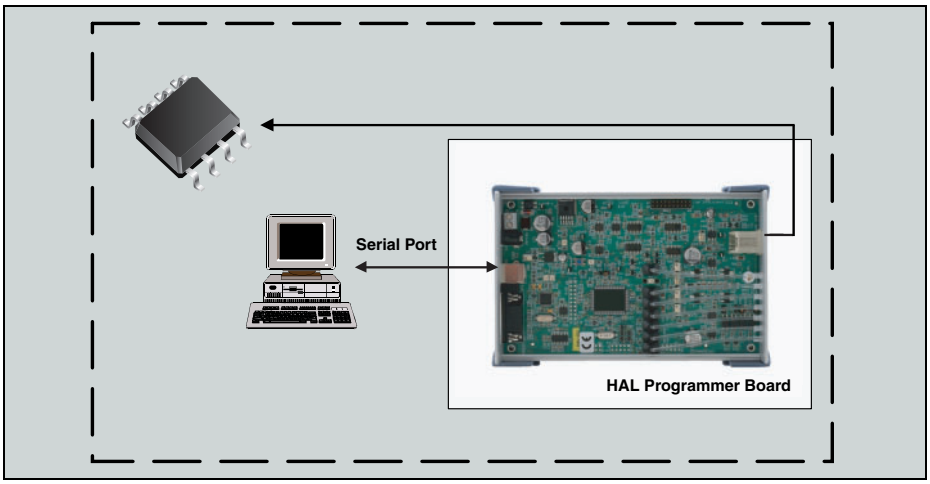

Fig. 1: Development tool setup

System Architecture

The HAL 3625 sensor is produced in a proven submicron CMOS technology.

The HAL 3625 features temperature-compensated Hall plates with choppered offset compensation, two A/D converters for the magnetic field information, a temperature sensor with A/D converter, digital signal processing, a push-pull output, an EEPROM memory with redundancy and lock function for the calibration data and the data register information, a serial interface for programming the EEPROM, and protection devices on all pins.

The HAL 3625 is programmable by modulating the output voltage. No additional programming pin is needed.

The internal digital signal processing is of great benefit because analog offsets, temperature shifts, and mechanical stress do not degrade the sensor accuracy.

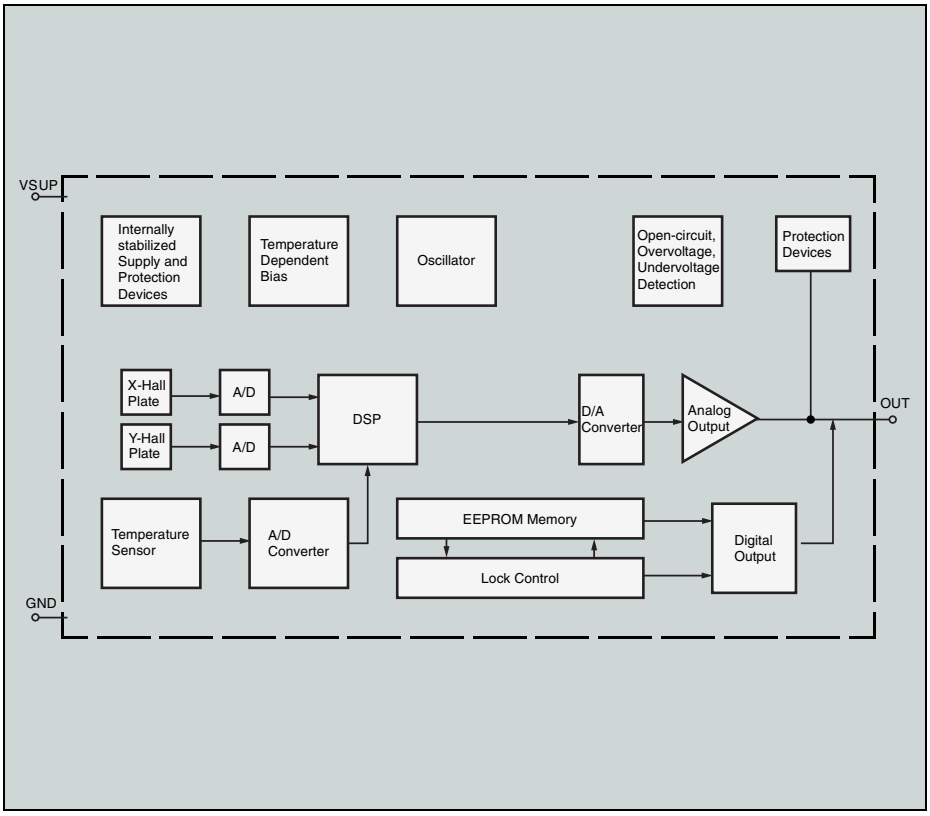

Fig. 2: Block diagram of the HAL 3625

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Micronas GmbH · Hans-Bunte-Strasse 19 · D-79108 Freiburg (Germany) · P.O. Box 840 · D-79008 Freiburg (Germany)
Tel. +49-761-517-0 · Fax +49-761-517-2174 · E-mail: docservice@micronas.com · www.micronas.com